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berg and Hoppe is therefore the oldest name of *C. misandra*, although the plant was first recognized as distinct when Robert Brown named it *C. misandra*. Under the circumstances it appears that Brown's name should stand.

The Study of the Parasitic Fungi.¹

BY T. J. BURRILL.

It needs no argument to show the practical value of the studies undertaken upon these minute—probably degraded—members of the vegetable world, for they subsist on living plants of the higher orders, upon which our domestic animals and ourselves depend for the means and materials of physical existence. It is not, indeed, usually known or suspected what proportion of our crops and useful vegetation is destroyed by the microscopic growths which live as parasites or saprophytes upon them; but when we come to understand that in very great measure the things called “blights,” “mildews,” “rusts,” “smuts,” “rots,” “ferments,” etc., are really due to the despoliations of these same microscopic but multitudinous forms of fungi, some appreciation can be gained by any one, even with a moment's thought, of the immense aggregate loss that occurs. Perhaps, in one sense, it is well that cultivators do not fully realize the number and variety of parasitic growths which await the development of their valuable plants, and which are liable so badly to injure the latter, and so seriously to affect the receipts for expended labor. Surely, in many cases, there would be sufficient ground for discouragement and hesitation to venture in opposition to such an array of dangerous enemies, against whose insidious and covert attacks fighting seems futile.

But knowledge of the existence of such things can not make that existence more hazardous, nor the results more distressing; while here, as in the other battles of life, to be forewarned is to be forearmed. Knowledge is power, and as much so in this case as in any other; if the latter is still wanting, it is only because the former has not been attained. Is it attainable? There are difficulties in the way. The objects are very minute; we can not see them by the unaided eye as individuals, we can not thus watch their modes of dissemination, germination, growth and development; we only see them, if at all, in the mass, and know of their

¹ From Bull. Ill. State Lab. Nat Hist., Volume II.

presence by their results. They have singular, and, to the students of other forms of life, unfamiliar physiological powers and properties; they assume peculiar disguises, and pass through unlooked-for stages of development, of which the connecting links are hard to make out; they lie dormant now, and again become wondrously quickened and enormously multiplied under circumstances not readily traced. But little by little, qualified observers have acquainted themselves with their existence as true species, veritable and distinct plants, and little by little have learned something of the mysteries of their life histories. Sometimes the advance in knowledge is gained by casual and lucky observations; but mostly by painstaking, systematic research, aided by all the appliances of the equipped laboratory and the fruitful skill of trained powers of manipulation and acute perception. A step gained is not only so much secured, but renders more possible other or further advance. The more becomes known, the easier progress is made, since that already acquired points the way towards new achievements. The beginning has been made, though this can scarcely be said to have been true until within very recent times. The men are now living and working who have made known all the ascertained facts of physiological processes and results in these parasitic fungi. The germination of fungus spores was not observed until within the present century.

During the last part of the first half of this century learned discussions arose upon the specific distinctions between the parasite and the host, and esteemed botanists held the view that what was taken for the former was but a diseased condition of the latter—the rust of wheat, for example, was only the degraded cell-tissues of the wheat itself. Such difference of opinion, however, no longer exists among those who have possession of the information now acquired. The tissues of higher plants do not change by any processes of degradation or transformation into the things called fungi, and neither do the latter originate in any other manner than as descendants of preëxisting parent forms through as rigid specific lines as can be traced among any animals or plants. It is known, too, that however much the fungus is formed within the tissues of the host plant, it began its growth outside of the latter and gained introduction only by forcible entrance. Spores are never taken up by absorption and carried by aqueous currents from part to part of the plant. The fungus passes through the tissues very much as roots pass through the soil, sometimes apparently without in any degree successful opposition, sometimes nearly or quite baffled in the struggle by the mechanical and physiological resistance of the host plant.